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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/580,768	05/25/2006	Masaru Takeshita	SHIGA7.051APC	8323

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EXAMINER

EOFF, ANCA

ART UNIT	PAPER NUMBER
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1795

NOTIFICATION DATE	DELIVERY MODE
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05/23/2008

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

jcartee@kmob.com
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Office Action Summary	Application No. 10/580,768	Applicant(s) TAKESHITA ET AL.	
	Examiner ANCA EOF	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 04 April 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 and 13-22 is/are pending in the application.
- 4a) Of the above claim(s) 1-10 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 11 and 13-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 May 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☒ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>05/25/2006, 05/18/2007</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. The foreign priority document JP 2003-399663, filed on November 28, 2003 was received and acknowledged. However, in order to benefit of the earlier filing date, a certified English translation is required.

Election/Restrictions

2. In response to the restriction requirement set forth in the previous Office Action, the applicant has elected group II, claims 11-12. Claim 12 has been canceled and claims 13-22 have been added, therefore claims 11 and 13-22 are pending in the application. Claims 1-10 are withdrawn from consideration.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraph of 35 U.S.C. 102 that forms the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claim 11 is rejected under 35 U.S.C. 102(b) as anticipated by Maeda (US Patent 5,626,782).

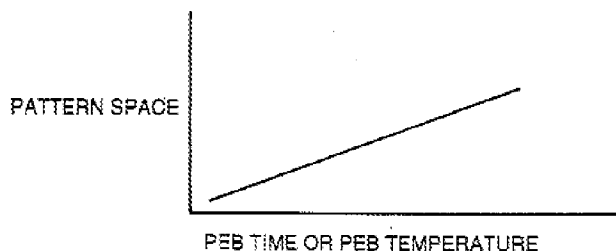
For examination purpose, the examiner interpreted “the size of the space pattern” as the size of the space in the line-and-space pattern, in light of the disclosure on page 40, line 2 of the specification of the instant application.

With regard to claim 11, Maeda discloses a process of forming the pattern comprising the steps of:

- forming a chemical amplification resist on a wafer (column 2, line 67-column 3, line 1);
- selectively exposing the form a latent image of the resist pattern (column 3, lines 1-2);
- performing post-exposure bake of the resist under conditions which are decided on the basis of the relation between the temperature of the time for the post-exposure baking and the change of the line width or the space of the resist pattern, in order to obtain a resist pattern having a desired line width or a desired space (column 3, lines 4-8), and
- developing the resist pattern (column 3, line 9).

A positive chemical amplification resist may be used (Embodiments 4-6 in column 7, line 47-column 9, line 62) and, in such situation, an alkaline developing solution is used (column 8, lines 14-15).

Maeda discloses a positive resist having the space of the resist pattern widened with the increase of a PEB time or a PEB temperature, as shown in fig. 16 which was reproduced below:



Maeda discloses that fig. 16 illustrates the relation between PEB temperature or the PEB time and the space in the finished resist pattern: the space is linearly increased with the increase of the PEB temperature or PEB time (column 9, lines 45-48).

In the process of forming a pattern, the positive chemical amplification resist (5) is irradiated with an electron beam (4) applied in a dimension D1 (column 9, lines 37-39 and fig.10). After PEB is carried out for a prescribed time, the resist is developed and a resist pattern (5a) has the space D3 predicted from the relation shown in fig. 16 (column 9, lines 49-52 and fig.11), wherein D3 is larger than D1 so the dimension l1 is finer than the minimum resolution (column 9, lines 56-58 and fig.11).

Maeda further discloses that the post-exposure apparatus (50) comprises input means (32) for inputting the relation between the PEB temperature or the PEB time and the line width or space of the resist pattern as finished, calculation means (34) for calculating the optimum PEB temperature or the optimum PEB time for obtaining a resist pattern having a desired line width or a desired space and control means (35) for controlling the hotplate (30) to be capable of post exposure baking the chemical amplification resist at the temperature or for the time obtained by the calculation means (34) (column 10, lines 5-20 and fig. 21-22).

Maeda further discloses that in the method of forming a fine resist pattern, the chemical amplification resist is post-exposure baked under conditions which are decided on the basis of the relation between the temperature or the time of the post-exposure baking and the change of the line width or the space of the finished resist pattern as to obtain a resist pattern having a desired line width or a desired space,

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whereby it is possible to obtain a pattern which is finer than the minimum resolution (column 11, lines 33-43).

Fig. 16 of Maeda is equivalent to the graph having PEB temperature along the horizontal axis and the size of the space of the line-and-space pattern on a vertical axis of the instant application.

The value of the space size where the pattern is finer than the minimum resolution, as shown in fig. 10 and 11 of Maeda, is equivalent to the point where the space size of the instant application reaches a maximum value.

The temperature corresponding to such value of the space size where the pattern is finer than the minimum resolution is equivalent to the optimum PEB temperature of the instant application.

Based on the teachings of Maeda, it is the examiner's position that the preliminary PEB temperature and the optimum PEB temperature are identical.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 13-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maeda (US Patent 5,626,782) in view of Uetani et al. (US Pg-Pub 2001/0044070).

With regard to claim 13, Maeda discloses the process of claim 11 of the instant application (see paragraph 4 of the Office Action), but fails to disclose that the positive chemical amplification resist has the composition required by the instant application

Uetani et al. disclose a chemical amplification type positive resist composition, said composition comprising a 2-ethyl-2-adamantyl methacrylate/3-hydroxy-1-adamantyl methacrylate/ α -methacryloxyloxy- γ -butyrolactone copolymer and an acid generator (Comparative Example 1 in table 1, par.0140 and par.0103). This composition shows excellent adhesion to the substrate, good resolution and sensitivity (Comparative Example 1 in table 2 in par.0141 and par.0132-0135).

The 2-ethyl-2-adamantyl methacrylate/3-hydroxy-1-adamantyl methacrylate/ α -methacryloxyloxy- γ -butyrolactone copolymer in a molar ratio of 2: 1: 1 (par.0103) is equivalent to the component (A) of the instant application, wherein :

- 2-ethyl-2-adamantyl methacrylate is equivalent to the unit (a-1);
- α -methacryloxy- γ -butyrolactone is equivalent to the unit (a-2), and
- 3-hydroxy-1-adamantyl methacrylate is equivalent to the unit (a-3).

Since the 2-ethyl-2-adamantyl methacrylate / α -methacryloxy- γ -butyrolactone/ 3-hydroxy-1-adamantyl methacrylate copolymer with a molar ratio 2:1:1 comprises the same components as the resins of the instant application and in similar amounts, as disclosed in paragraphs 0055, 0084, 0086, 0087, 0090-0094 of the instant application and, absent a reason to the contrary, it is the examiner's position that the 2-ethyl-2-adamantyl methacrylate / α -methacryloxy- γ -butyrolactone/ 3-hydroxy-1-adamantyl

methacrylate copolymer with a molar ratio 2:1:1 has a glass transition temperature (T_g) in the range of 100 to 170°C.

"[T]he discovery of a previously unappreciated property of a prior art composition, or of a scientific explanation for the prior art's functioning, does not render the old composition patentably new to the discoverer." *Atlas Powder Co. v. Ireco Inc.*, 190 F.3d 1342, 1347, 51 USPQ2d 1943, 1947 (Fed. Cir. 1999). Thus the claiming of a new use, new function or unknown property which is inherently present in the prior art does not necessarily make the claim patentable. *In re Best*, 562 F.2d 1252, 1254, 195 USPQ 430, 433 (CCPA 1977). (MPEP 2112)

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the chemically amplified positive resist composition of Uetani et al. in the process of forming a resist pattern of Maeda, in order to take advantage of the properties of the chemically amplified positive resist composition of Uetani et al., such as adhesion to the substrate, sensitivity and resolution (Uetani et al., Comparative Example 1 in table 2 in par.0141 and par.0132-0134).

With regard to claim 14, Uetani et al. disclose that the molecular weight of the 2-ethyl-2-adamatyl methacrylate / α -methacryloxy- γ -butyrolactone/ 3-hydroxy-1-adamantyl methacrylate copolymer is about 8,000 (par.0103).

With regard to claims 15 and 16, the 2-ethyl-2-adamatyl methacrylate unit of the 2-ethyl-2-adamatyl methacrylate / α -methacryloxy- γ -butyrolactone/ 3-hydroxy-1-adamantyl methacrylate copolymer (par.0103) is equivalent to the group of formula (I), wherein R is a methyl group and R¹ is an ethyl group.

With regard to claim 17, the α -methacryloxy- γ -butyrolactone unit of the 2-ethyl-2-adamatyl methacrylate / α -methacryloxy- γ -butyrolactone/ 3-hydroxy-1-adamantyl

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methacrylate copolymer (par.0103) is equivalent to the group of formula (IV), wherein R is a methyl group and R⁵ is hydrogen.

With regard to claim 18, the 3-hydroxy-1-adamantyl methacrylate unit of the 2-ethyl-2-adamatyl methacrylate / α -methacryloxy- γ -butyrolactone/ 3-hydroxy-1-adamantyl methacrylate copolymer (par.0103) is equivalent to the group of formula (VI), wherein R is a methyl group and n=1.

With regard to claims 19-21, the 2-ethyl-2-adamatyl methacrylate / α -methacryloxy- γ -butyrolactone/ 3-hydroxy-1-adamantyl methacrylate copolymer with a molar ratio 2:1:1 (par.0103) is equivalent to the component (A) having 50 mol % of unit (a-1), 25 mol % of unit (a-2) and 25 mol% of unit (a-3) of the instant application.

With regard to claim 22, Uetani et al. further disclose that the chemical amplification type positive resist composition further comprises a nitrogen-containing basic compound in an amount of 0.075% by weight relative to the resin (see Comparative Example 1 in table 1 in par.0140).

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Yoshioka et al. (US Patent 5,968,691) disclose a process of controlling the line width of a pattern, said controlling process being represented by the flow chart below:

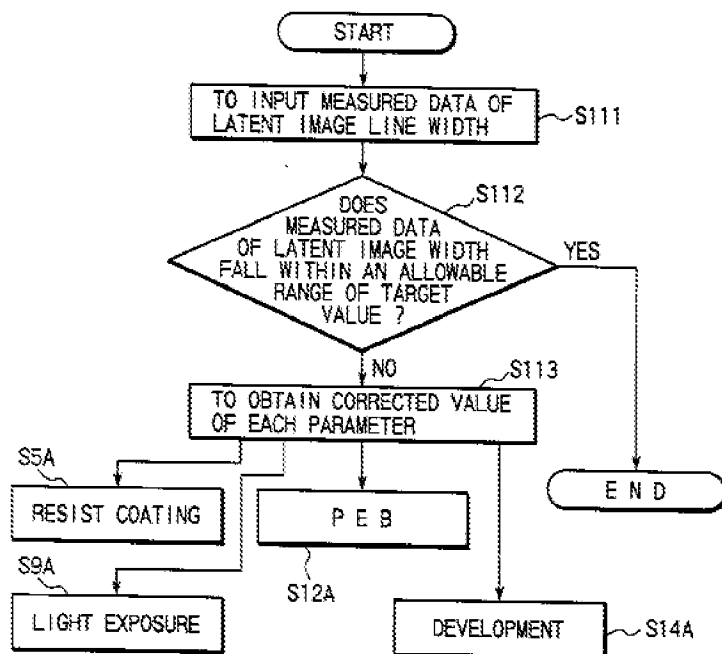


FIG. 6

Yoshioka et al. further discloses the relationship between the PEB temperature ($^{\circ}\text{C}$) and the average line width (μm)::

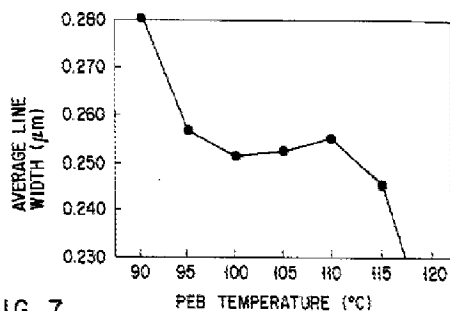


FIG. 7

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANCA EOFF whose telephone number is (571)272-9810. The examiner can normally be reached on Monday-Friday, 6:30 AM-4:00 PM, EST.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. E./

Examiner, Art Unit 1795

/Cynthia H Kelly/

Supervisory Patent Examiner, Art Unit 1795